

CURRENT CLAIMS

A copy of the claims is provided below for the convenience of the Examiner. The claims are not amended.

1.-20. (Cancelled).

21. (Previously Presented) A system comprising:

a plurality of actuators distributed in a cross-machine direction of a sheet-making machine at respective fixed positions over a sheet of material, each actuator operable to perform (i) a first control action with a magnitude on a slice of the sheet and (ii) a second control action to manipulate a cross-directional shape within the slice, each actuator controllable to vary one or more properties of the sheet by varying both the magnitude and the cross-directional shape within the slice;

at least one scanner operable to measure the one or more properties of the sheet; and

a controller in communication with the at least one scanner and operable to calculate the first and second control actions for each actuator and to implement the first and second control actions at each actuator such that the actuators co-operate to adjust the one or more properties of the sheet to one or more desired targets.

22. (Previously Presented) The system of claim 21, wherein each actuator comprises a steam actuator having an outlet chamber for releasing steam to the sheet; and
wherein dimensions of the outlet chamber in each steam actuator are adjustable to control the cross-directional shape within the slice associated with that steam actuator.

23. (Previously Presented) The system of claim 22, wherein the outlet chamber of each steam actuator includes at least one baffle plate which is movable to control a cross-directional position and the dimensions of that outlet chamber.

24. (Previously Presented) The system of claim 21, wherein each actuator comprises a steam actuator having:
an outlet chamber for releasing steam to the sheet;
a screen plate with openings covering the outlet chamber; and
at least one movable plate, wherein movement of the at least one movable plate with respect to the screen plate acts to fully or partially obstruct the openings in the screen plate.

25. (Previously Presented) The system of claim 21, wherein each actuator comprises a steam actuator having an outlet chamber for releasing a flow of steam to the sheet;
and
wherein at least one air jet associated with the outlet chamber is dischargable to control a shape of the steam flow.

26. (Withdrawn and Previously Presented) The system of claim 21, wherein each actuator comprises a nozzle for delivering a water spray atomized by air pressure to the sheet and means for adjusting the air pressure at the nozzle to control a shape of the water spray.

27. (Withdrawn and Previously Presented) The system of claim 21, wherein each actuator comprises a nozzle for delivering a water spray atomized by air pressure to the sheet and means for adjusting an air flow at the nozzle to control a shape of the water spray.

28. (Withdrawn and Previously Presented) The system of claim 21, wherein each actuator comprises a nozzle for delivering a water spray atomized by air pressure to the sheet, the nozzle having a water discharge opening and an air discharge opening that are adjustable by position with respect to each other to control a shape of the water spray.

29. (Withdrawn and Previously Presented) The system of claim 21, wherein each actuator comprises an induction heating coil for heating at least one of a pair of rolls to vary a gap between the pair of rolls and thereby a thickness of the sheet passing through the gap between the rolls, each coil having multiple windings for generating magnetic fields, whereby controlling a current provided to each of the multiple windings controls the cross-directional shape associated with the second control action of that actuator.

30. (Withdrawn and Previously Presented) The system of claim 21, wherein each actuator comprises an induction heating coil for heating at least one of a pair of rolls to vary a gap between the pair of rolls and thereby a thickness of the sheet passing through the gap between the rolls, each heating coil being mounted for pivotable movement, whereby adjusting an angle of the heating coil controls the cross-directional shape associated with the second control action of that actuator.

31. (Withdrawn and Previously Presented) The system of claim 21, wherein each actuator comprises an array of infrared heating lamps for heating the sheet, whereby controlling a voltage of each heating lamp controls the cross-directional shape associated with the second control action of that actuator.

32. (Withdrawn and Previously Presented) The system of claim 21, wherein each actuator comprises a gas-fired infrared emitter matrix for generating infrared radiation to heat the sheet, the emitter matrix heated by combusting gas and having screen plates with openings, whereby moving the screen plates with respect to each other to fully or partially align or misalign the openings in the screen plates acts to vary a gas supply to the emitter matrix to control the cross-directional shape associated with the second control action of that actuator.

33. (Cancelled).

34. (Previously Presented) The system of claim 21, wherein each actuator is operable individually to perform the first control action and the second control action.

35. (Previously Presented) The system of claim 21, wherein each actuator is controllable to vary the one or more properties of the sheet by simultaneously varying both the magnitude and the cross-directional shape within the slice; and

wherein the controller is operable to implement the first and second control actions simultaneously at each of the actuators.

36. (Previously Presented) A system comprising:

a plurality of steam actuators distributed in a cross-machine direction of a sheet-making machine over a sheet of material, each steam actuator having an outlet chamber formed by a space between a first plate, a second plate and an outer wall, wherein the first plate is designed to contain a nozzle through which steam is received, and wherein the second plate contains a plurality of openings to allow passage of the steam received from the nozzle onto the sheet, the outlet chamber in each steam actuator operable to release steam of a magnitude and to manipulate a cross-directional shape within a slice of the sheet, the outlet chamber in each steam actuator controllable to release steam to vary both the magnitude and the cross-directional shape within the slice;

at least one scanner operable to measure one or more properties of the sheet; and

a controller in communication with the at least one scanner and operable to calculate the magnitude and the cross-directional shape for each steam actuator and to cause each outlet chamber to release steam with a corresponding magnitude and cross-directional shape such that the steam actuators co-operate to adjust the one or more properties of the sheet to one or more desired targets.

37. (Previously Presented) The system of claim 36, wherein the outlet chamber of each steam actuator includes at least one baffle plate which is movable to control dimensions of that outlet chamber, which in turn causes release of steam with the corresponding cross-directional shape by that outlet chamber.

38. (Previously Presented) The system of claim 36, wherein each outlet chamber further includes at least one movable plate, and wherein movement of the at least one movable plate with respect to the second plate of that outlet chamber acts to fully or partially obstruct the plurality of openings in the second plate of that outlet chamber, thereby causing release of steam with the corresponding cross-directional shape by that outlet chamber.

39. (Previously Presented) The system of claim 36, wherein each outlet chamber is operable to release a flow of steam and includes at least one air jet, the at least one air jet dischargable to control a shape of the steam flow from that outlet chamber.

40. (Withdrawn and Previously Presented) A system comprising:
a steam actuator associated with an outlet chamber, the steam actuator operable to release steam of an adjustable magnitude and in an adjustable cross-directional shape through the outlet chamber;

a scanner operable to measure one or more properties of a sheet of material; and

a controller operable to identify a specified magnitude and a specified cross-directional shape for the steam based on measurements from the scanner, the controller also operable to cause the steam actuator to release steam of the specified magnitude and in the specified cross-directional shape.

41. (Withdrawn and Previously Presented) The system of Claim 40, wherein the outlet chamber is formed by a space between a first plate, a second plate, and an outer wall.

42. (Withdrawn and Previously Presented) The system of Claim 41, wherein the first plate is configured to contain a nozzle through which the steam is received, and wherein the second plate contains a plurality of openings to allow passage of the steam received from the nozzle onto the sheet.

43. (Withdrawn and Previously Presented) The system of Claim 42, wherein the outlet chamber includes at least one movable plate; and
wherein movement of the at least one movable plate with respect to the second plate acts to fully or partially obstruct the openings in the second plate.

44. (Withdrawn and Previously Presented) The system of Claim 40, wherein the outlet chamber includes at least one baffle plate that is movable to control dimensions of the outlet chamber.

45. (Withdrawn and Previously Presented) The system of Claim 40, wherein the outlet chamber is operable to release a flow of steam and includes at least one air jet, the at least one air jet adjustable to control the cross-directional shape of the steam flow.

46. (Withdrawn and Previously Presented) The system of Claim 40, wherein:
the system comprises multiple steam actuators; and
the controller is operable to identify the specified magnitude and the specified cross-directional shape for the steam released by each of the multiple steam actuators.

47. (Withdrawn and Previously Presented) An apparatus comprising:
a steam actuator; and
an outlet chamber;
wherein the steam actuator is operable to release steam of an adjustable magnitude and in an adjustable cross-directional shape through the outlet chamber.

48. (Withdrawn and Previously Presented) The apparatus of Claim 47, wherein the outlet chamber is formed by a space between a first plate, a second plate, and an outer wall.

49. (Withdrawn and Previously Presented) The apparatus of Claim 48, wherein the first plate is configured to contain a nozzle through which the steam is received, and wherein the second plate contains a plurality of openings to allow passage of the steam received from the nozzle onto a sheet of material.

50. (Withdrawn and Previously Presented) The apparatus of Claim 49, wherein the outlet chamber includes at least one movable plate; and

wherein the steam actuator comprises at least one motor operable to move the at least one movable plate with respect to the second plate to fully or partially obstruct the openings in the second plate.

51. (Withdrawn and Previously Presented) The apparatus of Claim 47, wherein the outlet chamber includes at least one baffle plate; and

wherein the steam actuator comprises at least one motor operable to move the at least one baffle plate to control dimensions of the outlet chamber.

52. (Withdrawn and Previously Presented) The apparatus of Claim 47, wherein the outlet chamber is operable to release a flow of steam; and

wherein the steam actuator comprises at least one air jet operable to control a shape of the steam flow.

53. (Withdrawn and Previously Presented) The apparatus of Claim 47, wherein the apparatus comprises multiple steam actuators.

54. (Withdrawn and Previously Presented) The apparatus of Claim 53, further comprising:

a manifold operable to provide the steam to the multiple steam actuators; and

a screen operable to deliver the steam from the multiple steam actuators to multiple zones of a sheet of material.